ASSOCIATION BETWEEN TRAFFIC-RELATED BLACK CARBON EXPOSURE AND THE CONNER'S CONTINUOUS PERFORMANCE TEST (CPT) AMONG URBAN CHILDREN IN A PROSPECTIVE BIRTH COHORT

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Background and Aims: Associations between ambient air pollution exposure and children's cognitive domains are only beginning to be examined and analyses have not accounted for community-level psychosocial stressors that may co-vary with pollution exposures. We assessed the relationship of exposure to black carbon (BC), a marker of traffic particles, with attention and vigilance domains while adjusting for exposure to community violence (ETV), among 192 children aged 6-12 years in a Boston-based prospective birth cohort.
Methods: BC levels were estimated using a validated spatio-temporal land-use regression model based on residence during the child's lifetime, then categorized into quartiles. Exposure to violence (ETV) in these neighborhoods was ascertained using the My Exposure to Violence survey, which was categorized into tertiles. Attention and vigilance were measured using the Conner's Continuous Performance Test (CPT). Primary outcomes included: omission errors, commission errors, hit reaction time (HRT), HRT standard error (SE), HRT block change, and HRT SE block change (higher scores indicating worse performance or slower reaction time). Multiple regression analyses were used to determine effects of BC levels on outcomes.
Results: Children were primarily Hispanic (55%) and Caucasians (42%). We found a positive association between BC levels with commission errors and HRT ($p < 0.05$), adjusting for age, gender, maternal education, ETV, and blood lead level. Higher-level ETV was associated with lower commission errors ($p < 0.05$). Additional inclusion of children's IQ, prenatal smoking, and postnatal secondhand smoke exposure did not alter these results. Gender-stratified analysis suggested that the effects of BC on CPT measures were stronger in boys ($p < 0.05$) for both commission errors and HRT, than in girls ($p > 0.2$).
Conclusions: In this population of urban children, we found a relationship between increased BC exposure with increased commission errors and slower reaction time. Effects of traffic-related pollution on attention domains may be stronger in boys.